

Druckexemplar

New Claims

1. An avionic system and ground station for aircraft out of route management and alarm communications comprising at least an avionic device, which is fitted onboard the aircraft, with a memory unit for storing predefined information, electronic processing means for processing the received information and comparing it in real time with pre-set values, interfaces for receiving information from onboard systems and sending commands to the aircraft's autopilot to take over the control of the aircraft and return it to pre-set flight levels or spatial positions, suitable sensors for obtaining data on the aircraft onboard situation, communication system for transmitting the onboard situation in real time to ground control stations and receive from the ground, or from another aircraft, appropriate instructions when predetermined events occur, characterised in that it comprises first means for carrying out a collision avoidance function, to avoid collisions when the aircraft is flying, but also during landing and take-off comprising a first monitoring state in which, the unit constantly compares the position of the aircraft with the pre-set and stored authorized limits and a second control state, when the aircraft deviates from the authorized limits the unit intervenes automatically on the autopilot, through the aforementioned interfaces, to take the aircraft to its spatial limit, second means for carrying out an alarm function comprising a first, monitoring state, whereby informations on the situation aircraft onboard are stored in the memory unit not automatically transmitted to the ground control stations., and a second alarm state which is activated in cases of alarm, whereby the informations generated onboard the aircraft the unit are transmitted the to the ground control stations for appropriate evaluation.
2. A management system according to claim 1, wherein said predefined information relates to flight paths, world's runways, orography of the land, obstacles and the pre-set values comprise flight paths and altitudes or flight levels.
3. A management system according to claim 2, wherein where the aircraft sensors comprise surveillance video cameras and miniature transmitters, wearable by the flight crew, in order to obtain information for the avionic unit.

4. A management system according to claim 3, wherein the video cameras comprise means for establishing whether they have been disabled, damaged, or are malfunctioning.

5. A management system according to claim 4, wherein the sensors comprise heart rate monitors for the pilots to be connected to the avionic unit.

6. A management system according to claim 4 comprising switches located in specific points of the aircraft available to crew and passengers to obtain information for the avionic unit, and a cockpit automatic locking system.

7. A management system according to claim 4 comprising, in the event of an emergency, means suitable for externally and/or automatically disabling the collision avoidance system in accordance to predefined rules.

8. A management system as claimed in one of the previous claims, comprising means for encrypting and coding the signals exchanged between the aircraft and the ground control station not interfering with the radio band communications.

9. A ground control station suitable for interfacing with the system of claim 1 comprising at least a computer for processing the received data, a transmission-reception radio system, an encrypting and/or coding system, and an audio-visual communications system characterised in that it comprises means for carrying out a collision avoidance function, to avoid collisions when the aircraft is flying, but also during landing and take-off comprising a first monitoring state in which, the unit constantly compares the position of the aircraft with the pre-set and stored authorized limits and a second control state, when the aircraft deviates from the authorized limits the unit intervenes automatically on the autopilot, through the aforementioned interfaces, to take the aircraft to its spatial limit, second means for carrying out a alarm function comprising a first, monitoring state, whereby informations on the situation aircraft onboard are stored in the memory unit not automatically transmitted to the ground control stations., and a second alarm state which is activated in cases of alarm, whereby the informations generated onboard the aircraft the unit are transmitted the to the ground control stations for appropriate evaluation.

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10. Method for aircraft out of route management comprising the following steps performed by an avionic system according to claim 1 and a ground station according to claim 9:

- Defining first data for a collision avoidance function and loading said data into the aircraft avionic unit,
 - Defining second data for an alarm function and loading said data into the aircraft avionic unit,
 - Defining third data for at least one ground control station and loading said data into the station,
 - Defining interfaces,
 - Defining communication channels and their respective properties,
 - Defining sensors, transmitters, switches, and video cameras,
 - Determining operating logics of the collision avoidance function and their implementation in the avionic unit,
 - Determining operating logics of the alarm function and their implementation in the avionic unit,
 - Determining operating logics of the ground control station and loading them into the station, comparing the position of the aircraft constantly with pre-set and stored authorized limits intervening automatically on the autopilot to take the aircraft to its spatial limit through the interfaces when the aircraft deviates from the authorized limits storing the situation of the aircraft onboard in the memory unit and not automatically transmitting to the ground control stations, transmitting said informations generated onboard to the ground control stations for appropriate evaluation when a second alarm state is activated in cases of alarm.
11. Method according to claim 10 wherein the electronic processing means process received information and compare it in real time with data referring to pre-set flight paths and allowed altitudes or flight levels, and wherein the interfaces receive flight information from onboard systems and send commands to the aircraft's autopilot to take over the control of the aircraft and bring it back to pre-set altitudes or flight levels or spatial positions, and wherein sensors obtain data on the situation onboard the aircraft, and wherein the communication means and the connecting interfaces transmit information relating to onboard situation in real time

to ground control stations and receive appropriate instructions from the ground control station or from another aircraft when predetermined events occur.

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